1. Add the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = 3x^3 + 8x + 5 \text{ and } g(x) = \sqrt{-5x - 18}$$

A. The domain is all Real numbers less than or equal to $x = a$, where $a \in [-7.6, 1.4]$

B. The domain is all Real numbers except $x = a$, where $a \in [-8.6, -3.6]$

C. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [4, 9]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [3.75, 10.75]$ and $b \in [1.2, 8.2]$

E. The domain is all Real numbers.

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2. Find the inverse of the function below. Then, evaluate the inverse at $x = 7$ and choose the interval that $f^-1(7)$ belongs to.

$$f(x) = \ln(x - 5) - 3$$

A. $f^{-1}(7) \in [22026.47, 22032.47]$

B. $f^{-1}(7) \in [162748.79, 162754.79]$

C. $f^{-1}(7) \in [58.6, 62.6]$

D. $f^{-1}(7) \in [22015.47, 22023.47]$

E. $f^{-1}(7) \in [-2.61, 10.39]$

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3. Determine whether the function below is 1-1.

$$f(x) = (4x + 22)^3$$

A. No, because the domain of the function is not $(-\infty, \infty)$.

B. Yes, the function is 1-1.

C. No, because the range of the function is not $(-\infty, \infty)$.

D. No, because there is an $x$-value that goes to 2 different $y$-values.

E. No, because there is a $y$-value that goes to 2 different $x$-values.

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4. Find the inverse of the function below. Then, evaluate the inverse at $x = 4$ and choose the interval that $f^-1(4)$ belongs to.

$$f(x) = e^{x-2} - 2$$

A. $f^{-1}(4) \in [-0.26, 0.56]$

B. $f^{-1}(4) \in [-2.74, -0.56]$

C. $f^{-1}(4) \in [-0.26, 0.56]$

D. $f^{-1}(4) \in [-2.74, -0.56]$

E. $f^{-1}(4) \in [3.68, 4.18]$

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5. Determine whether the function below is 1-1.

$$f(x) = 9x^2 + 126x + 441$$

A. No, because there is a $y$-value that goes to 2 different $x$-values.

B. No, because the range of the function is not $(-\infty, \infty)$.

C. No, because there is an $x$-value that goes to 2 different $y$-values.

D. No, because the domain of the function is not $(-\infty, \infty)$.

E. Yes, the function is 1-1.

---

6. Choose the interval below that $f$ composed with $g$ at $x = 1$ is in.

$$f(x) = 3x^3 + 2x^2 - 4x \text{ and } g(x) = 3x^3 + 2x^2 - 4x + 1$$

A. $(f \circ g)(1) \in [-13, -3]$

B. $(f \circ g)(1) \in [21, 25]$

C. $(f \circ g)(1) \in [16, 21]$

D. $(f \circ g)(1) \in [1, 4]$

E. It is not possible to compose the two functions.

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7. Choose the interval below that $f$ composed with $g$ at $x = -1$ is in.

$$f(x) = x^3 - 2x^2 - x + 2 \text{ and } g(x) = -x^3 + 4x^2 + x$$

A. $(f \circ g)(-1) \in [35, 40]$

B. $(f \circ g)(-1) \in [29, 31]$

C. $(f \circ g)(-1) \in [-4, 1]$

D. $(f \circ g)(-1) \in [7, 18]$

E. It is not possible to compose the two functions.

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8. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = -14$ and choose the interval that $f^-1(-14)$ belongs to.

$$f(x) = \sqrt[3]{5x - 4}$$

A. $f^{-1}(-14) \in [547, 548.6]$

B. $f^{-1}(-14) \in [-551.3, -548.6]$

C. $f^{-1}(-14) \in [-548.6, -546.7]$

D. $f^{-1}(-14) \in [549, 552.1]$

E. The function is not invertible for all Real numbers.

---

9. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = -15$ and choose the interval that $f^-1(-15)$ belongs to.

$$f(x) = 3x^2 - 4$$

A. $f^{-1}(-15) \in [2.27, 2.72]$

B. $f^{-1}(-15) \in [2.73, 3.19]$

C. $f^{-1}(-15) \in [5.61, 6.24]$

D. $f^{-1}(-15) \in [1.77, 2.01]$

E. The function is not invertible for all Real numbers.

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10. Subtract the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = \frac{3}{3x - 14} \text{ and } g(x) = 2x^2 + 3x + 7$$

A. The domain is all Real numbers except $x = a,$ where $a \in [3.67, 13.67]$

B. The domain is all Real numbers greater than or equal to $x = a,$ where $a \in [-8.67, -1.67]$

C. The domain is all Real numbers less than or equal to $x = a,$ where $a \in [-3, 0]$

D. The domain is all Real numbers except $x = a$ and $x = b,$ where $a \in [2.67, 6.67]$ and $b \in [-4.67, 1.33]$

E. The domain is all Real numbers.

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11. Subtract the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = x^4 + 8x^3 + 7x + 7 \text{ and } g(x) = \frac{1}{5x + 36}$$

A. The domain is all Real numbers greater than or equal to $x = a,$ where $a \in [-7, -3]$

B. The domain is all Real numbers less than or equal to $x = a,$ where $a \in [-6.33, -0.33]$

C. The domain is all Real numbers except $x = a,$ where $a \in [-11.2, -2.2]$

D. The domain is all Real numbers except $x = a$ and $x = b,$ where $a \in [-6.33, -3.33]$ and $b \in [1.2, 8.2]$

E. The domain is all Real numbers.

12. Find the inverse of the function below. Then, evaluate the inverse at $x = 9$ and choose the interval that $f^-1(9)$ belongs to.

$$f(x) = \ln(x - 2) - 5$$

A. $f^{-1}(9) \in [1090.63, 1098.63]$

B. $f^{-1}(9) \in [59866.14, 59873.14]$

C. $f^{-1}(9) \in [1202600.28, 1202606.28]$

D. $f^{-1}(9) \in [1202603.28, 1202608.28]$

E. $f^{-1}(9) \in [51.6, 59.6]$

13. Determine whether the function below is 1-1.

$$f(x) = -25x^2 + 30x + 391$$

A. No, because there is an $x$-value that goes to 2 different $y$-values.

B. No, because there is a $y$-value that goes to 2 different $x$-values.

C. No, because the domain of the function is not $(-\infty, \infty)$.

D. No, because the range of the function is not $(-\infty, \infty)$.

E. Yes, the function is 1-1.

14. Find the inverse of the function below. Then, evaluate the inverse at $x = 8$ and choose the interval that $f^-1(8)$ belongs to.

$$f(x) = \ln(x + 5) - 2$$

A. $f^{-1}(8) \in [22019.47, 22022.47]$

B. $f^{-1}(8) \in [442411.39, 442413.39]$

C. $f^{-1}(8) \in [22029.47, 22035.47]$

D. $f^{-1}(8) \in [13.09, 22.09]$

E. $f^{-1}(8) \in [395.43, 399.43]$

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15. Determine whether the function below is 1-1.

$$f(x) = 9x^2 - 78x + 169$$

A. Yes, the function is 1-1.

B. No, because there is an $x$-value that goes to 2 different $y$-values.

C. No, because there is a $y$-value that goes to 2 different $x$-values.

D. No, because the range of the function is not $(-\infty, \infty)$.

E. No, because the domain of the function is not $(-\infty, \infty)$.

---

16. Choose the interval below that $f$ composed with $g$ at $x = -1$ is in.

$$f(x) = x^3 + 2x^2 - 3x - 3 \text{ and } g(x) = -2x^3 - 2x^2 + 3x + 2$$

A. $(f \circ g)(-1) \in [0.74, 1.77]$

B. $(f \circ g)(-1) \in [0.74, 1.77]$

C. $(f \circ g)(-1) \in [-6.62, -4.63]$

D. $(f \circ g)(-1) \in [-4.38, -3.54]$

E. It is not possible to compose the two functions.

---

17. Choose the interval below that $f$ composed with $g$ at $x = -1$ is in.

$$f(x) = -3x^3 + 4x^2 + x - 3 \text{ and } g(x) = -2x^3 + 3x^2 + 3x - 2$$

A. $(f \circ g)(-1) \in [-4, 1]$

B. $(f \circ g)(-1) \in [-13, -6]$

C. $(f \circ g)(-1) \in [1, 7]$

D. $(f \circ g)(-1) \in [-29, -19]$

E. It is not possible to compose the two functions.

18. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = 15$ and choose the interval that $f^-1(15)$ belongs to.

$$f(x) = 4x^2 + 3$$

A. $f^{-1}(15) \in [1.41, 1.79]$

B. $f^{-1}(15) \in [2.37, 2.82]$

C. $f^{-1}(15) \in [5.29, 6]$

D. $f^{-1}(15) \in [2.06, 2.37]$

E. The function is not invertible for all Real numbers.

19. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = 11$ and choose the interval that $f^-1(11)$ belongs to.

$$f(x) = 2x^2 + 5$$

A. $f^{-1}(11) \in [2.52, 2.9]$

B. $f^{-1}(11) \in [1.19, 2.72]$

C. $f^{-1}(11) \in [5.06, 7.17]$

D. $f^{-1}(11) \in [2.97, 4.59]$

E. The function is not invertible for all Real numbers.

20. Subtract the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = 5x^3 + 9x^2 + 3x + 3 \text{ and } g(x) = \frac{5}{5x - 34}$$

A. The domain is all Real numbers greater than or equal to $x = a,$ where $a \in [7, 13]$

B. The domain is all Real numbers less than or equal to $x = a,$ where $a \in [-0.8, 5.2]$

C. The domain is all Real numbers except $x = a$, where $a \in [5.8, 8.8]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [-14.67, -1.67]$ and $b \in [-6.17, 4.83]$

E. The domain is all Real numbers.

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21. Add the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = \sqrt{-3x - 16} \text{ and } g(x) = 3x^3 + 9x$$

A. The domain is all Real numbers except $x = a$, where $a \in [4.2, 12.2]$

B. The domain is all Real numbers less than or equal to $x = a$, where $a \in [-7.33, 0.67]$

C. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [5.33, 11.33]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [5.67, 8.67]$ and $b \in [4.6, 12.6]$

E. The domain is all Real numbers.

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22. Find the inverse of the function below. Then, evaluate the inverse at $x = 7$ and choose the interval that $f^-1(7)$ belongs to.

$$f(x) = \ln(x - 5) - 2$$

A. $f^{-1}(7) \in [153.41, 157.41]$

B. $f^{-1}(7) \in [8107.08, 8112.08]$

C. $f^{-1}(7) \in [2.39, 7.39]$

D. $f^{-1}(7) \in [8096.08, 8099.08]$

E. $f^{-1}(7) \in [162748.79, 162755.79]$

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23. Determine whether the function below is 1-1.

$$f(x) = 25x^2 + 220x + 484$$

A. Yes, the function is 1-1.

B. No, because the range of the function is not $(-\infty, \infty)$.

C. No, because there is an $x$-value that goes to 2 different $y$-values.

D. No, because there is a $y$-value that goes to 2 different $x$-values.

E. No, because the domain of the function is not $(-\infty, \infty)$.

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24. Find the inverse of the function below. Then, evaluate the inverse at $x = 10$ and choose the interval that $f^-1(10)$ belongs to.

$$f(x) = e^{x+5} - 3$$

A. $f^{-1}(10) \in [-1.1, -0.84]$

B. $f^{-1}(10) \in [7.32, 8.32]$

C. $f^{-1}(10) \in [-0.32, 0.71]$

D. $f^{-1}(10) \in [-2.55, -1.81]$

E. $f^{-1}(10) \in [-2.19, -1.3]$

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25. Determine whether the function below is 1-1.

$$f(x) = (5x + 17)^3$$

A. No, because the range of the function is not $(-\infty, \infty)$.

B. Yes, the function is 1-1.

C. No, because there is a $y$-value that goes to 2 different $x$-values.

D. No, because there is an $x$-value that goes to 2 different $y$-values.

E. No, because the domain of the function is not $(-\infty, \infty)$.

---

26. Choose the interval below that $f$ composed with $g$ at $x = -1$ is in.

$$f(x) = -4x^3 - 2x^2 + 4x \text{ and } g(x) = -3x^3 - 4x^2 - x - 3$$

A. $(f \circ g)(-1) \in [10, 23]$

B. $(f \circ g)(-1) \in [83, 91]$

C. $(f \circ g)(-1) \in [75, 84]$

D. $(f \circ g)(-1) \in [3, 15]$

E. It is not possible to compose the two functions.

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27. Choose the interval below that $f$ composed with $g$ at $x = 1$ is in.

$$f(x) = 2x^3 + 2x^2 - 3x \text{ and } g(x) = -4x^3 + x^2 + 2x - 3$$

A. $(f \circ g)(1) \in [-9, -3]$

B. $(f \circ g)(1) \in [1, 4]$

C. $(f \circ g)(1) \in [-84, -83]$

D. $(f \circ g)(1) \in [-76, -73]$

E. It is not possible to compose the two functions.

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28. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = -10$ and choose the interval that $f^-1(-10)$ belongs to.

$$f(x) = \sqrt[3]{4x - 3}$$

A. $f^{-1}(-10) \in [-250, -247]$

B. $f^{-1}(-10) \in [246.4, 250.6]$

C. $f^{-1}(-10) \in [249.9, 253]$

D. $f^{-1}(-10) \in [-250.9, -249.9]$

E. The function is not invertible for all Real numbers.

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29. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = -15$ and choose the interval that $f^-1(-15)$ belongs to.

$$f(x) = 5x^2 - 2$$

A. $f^{-1}(-15) \in [5.33, 5.75]$

B. $f^{-1}(-15) \in [1.81, 2.05]$

C. $f^{-1}(-15) \in [1.48, 1.65]$

D. $f^{-1}(-15) \in [4.33, 4.91]$

E. The function is not invertible for all Real numbers.

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30. Subtract the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = 9x^2 + 8x + 6 \text{ and } g(x) = 5x^3 + 8x^2 + 5x + 6$$

A. The domain is all Real numbers less than or equal to $x = a$, where $a \in [0.5, 5.5]$

B. The domain is all Real numbers except $x = a$, where $a \in [6.2, 7.2]$

C. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [2.67, 9.67]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [-7.33, 1.67]$ and $b \in [-5.25, -2.25]$

E. The domain is all Real numbers.

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